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August 2006

Environmental Education and a Proposal for Its Implementation in Public Schools

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Abstract

Human impact on nature has led to global environmental destruction and degradation. Young people are not environmentally knowledgeable, and they are not receiving the type of instruction they need in order to be environmentally literate citizens. In order to repair some of the damage that has been done and to diminish future impact, environmental education must be thoroughly and thoughtfully incorporated into people's lives.

Environmental education has existed, in various forms, for nearly a century as, at best, a supplement to "real education." Rather than being a fringe subject, environmental education warrants attention in American education that is equal to core curriculum subjects such as math, science and English. There are many viable approaches for the widespread inclusion of environmental education, but the three components that must be included in any successful program are: interdisciplinary study; place-based, experiential learning; and improved teacher training in environmental education.

Why We Need Environmental Education

For thousands of years, cultures and civilizations that depended on the land for daily survival did not take nature for granted. In North America, Native Americans “understood nature as a community to which humans as well as every other living thing belonged and on which they depended” (Nash 13). These earlier inhabitants of the countryside saw the direct relationship between the land and themselves. Their connectedness to the elements was how these people were able to survive. Parents and elders of the tribes taught their children to respect nature for its gifts, for its beauty, and for its power. Most importantly, they taught how life depended on this relationship, because for them this relationship with nature was a matter of survival, it was also their spiritual center. Black Elk, a Sioux from the northern Great Plains, describes the importance of being able to read nature and learn from it:

‘...You have noticed that everything an Indian does is in a circle, and that is because the Power of the World always works in circles, and everything tries to be round. In the old days when we were a strong and happy people, all our power came to us from the sacred hoop of the nation, and so long as the hoop was unbroken, the people flourished. The flowering tree was the living center of the hoop...the east gave peace and light, the south gave warmth, the west gave rain, and the north with its cold and mighty wind gave strength and endurance. This knowledge came to us from the outer world with our religion. Everything the Power of the World

does is done in a circle. The sky is round, and I have heard that the earth is round like a ball, and so are all the stars. The wind, in its greatest power, whirls. Birds make their nests in circles...(Nash 14).

This connection that Black Elk describes is characteristic of most Native American peoples, and it is a connection that people throughout time could once understand. For similar reasons, the farmers and the frontiersmen who settled and shaped the United States were subject to the harshness as well as the bounty of the land. Without the use of modern technology in their lives, their days and nights were dictated by the sun's rising and setting, by the changeable climate, and they were ultimately at the mercy of the wilds.

This dependence on nature was due to the everyday interaction with nature that these people were faced with. People plied themselves with water, shelter and food. In the space of 100 years, human interaction with nature in developed nations has led to the decline of environmental knowledge because they simply do not have daily contact with the land. Since the advent of industry, including and perhaps especially industrialized agriculture, humans have succeeded in taming nature. They have created roads and modes of transportation that allow them to travel in all seasons and in nearly all types of weather. They have built homes and places of business with interiors that maintain a constant temperature throughout the year. They have designed elaborate plumbing that allows them to access water and dispose of waste without leaving the comforts of their homes. All of these changes were welcome advancements in people's lives, and these

improvements helped ease the difficulty of living. So gradual were these changes and so improved were the living conditions that very few people concerned themselves with what might be lost when these conveniences were introduced and when the old ways of living were gone.

What harm might come as a result of society's detachment from nature?

Richard Louv, author of Last Child in the Woods, refers to the results of this change in how and where people live as "nature deficit disorder." His book focuses on how children, in particular, suffer from this lack of a relationship with the environment. Louv attributes various modern ailments and disorders to this nature deficit, including Attention Deficit Disorder (ADD), Attention Deficit Hyperactivity Disorder (ADHD), obesity, heart problems and depression (98-99). He argues that until only a half century ago, most American families had "some kind of agricultural connection" and therefore some means of releasing energy by "doing farm chores, baling hay, splashing in the swimming hole, climbing trees..." (101).

In addition to the possible physical and emotional harm that an increasingly insulated existence has caused, there is evidence that in gaining the conveniences that technology has provided, we have also become deprived of the full use of our senses. Edward Reed is a former associate professor of psychology at Franklin and Marshall College in Lancaster, Pennsylvania. Reed observed that little attention was paid by most people and institutions to what he called "primary experience"; that is, the things that people can see, taste, feel, smell and hear for themselves (Louv 64). According to Reed, we are losing 'the ability to experience our world

directly. What we have come to mean by the term experience is impoverished; what we have of experience in daily life is impoverished as well' (Louv 64).

North Carolina State professor Robin Moore echoes Reed's sentiments in his examination of modern children and their play behaviors. Moore writes:

Children live through their senses. Sensory experiences link the child's exterior world with their interior, hidden, affective world. Since the natural environment is the principal source of sensory stimulation, freedom to explore and play with the outdoor environment through the senses in their own space and time is essential for healthy development of an interior life...This type of self-activated, autonomous interaction is what we call free play. Individual children test themselves by interacting with their environment, activating their potential and reconstructing human culture. The content of the environment is a critical factor in this process. A rich, open environment will continuously present alternative choices for creative engagement. A rigid, bland environment will limit healthy growth and development of the individual or the group (Louv 65).

Environmental education organizations and institutions are trying to answer the question "How much has been lost?". One way of quantifying what people know about the world around them is to test for environmental literacy. Environmental literacy is, put simply, the capacity of an individual to show an understanding of how people and societies relate to one another and to natural systems and how they might continue to do so in perpetuity (Elder 15). David Orr,

Professor and Chair of the Environmental Studies Program at Oberlin College, provides a more detailed and poetic explanation of environmental literacy when he says it, 'presumes a breadth of experience with healthy natural systems...the knowledge necessary to comprehend interrelatedness...an attitude of care or stewardship...in a phrase, it is that quality of mind that seeks out connections...' (Elder 17).

Understanding exactly where the United States stands with respect to environmental literacy has been the task of the National Environmental Education & Training Foundation (NEETF) since 1997 when it joined with Roper Public Affairs to begin formal testing of the environmental proficiency of Americans. Every year between 1997 and 2001, the NEETF and Roper conducted a quiz of adults of all ages and backgrounds to determine what knowledge of environmental issues American adults possessed. The results of the quiz were evaluated each year, and in 2005 a comprehensive report compiled by Kevin Coyle was released, entitled Environmental Literacy in America. This final report provides a comprehensive look at the significance of the surveys.

Each year the questions were the same, but each year the goal of NEETF and Roper was to evaluate a specific aspect of environmental awareness. In 1997, the assessment of the quiz focused on basic environmental literacy. In 1998, the goal was to determine how pervasive certain myths about the environment were within the population and how apprehensive people were about the future as it related to the environment. In 1999, the test researchers tried to determine how

prepared Americans were to handle the environmental issues that would be important in the future. In 2000, the goal again was to sample basic environmental literacy, and in 2001 the assessors of the quiz focused specifically on how well Americans were educated about energy issues (Coyle 2). The significance of the separate focus each year of the quiz was to isolate the specific deficits in peoples' educations and to illustrate the complexity of environmental literacy. Rather than being a set of facts and figures that people either know or do now know, environmental literacy involves a different consciousness and a separate way of thinking. For a list of quiz questions see Appendix 1.

The NEETF report uses a framework for characterizing and for discussing public environmental education. This framework consists of three levels of learning. The first level is "environmental awareness," and it is best defined as "simple familiarity with an environmental subject with little real understanding of its deeper causes and implications" (Coyle xiii). The next level is "personal conduct knowledge" and it involves a moderate degree of both information and action that contribute to environmental improvements that might include conservation of home energy, water, and fuel (Coyle xiii). The final and highest level of learning is "environmental literacy," and it involves imparting "environmental principles, the skills needed to investigate [the environment] and an understanding of how to apply that information" (Coyle xiii). Environmental literacy is a long-term process, and involves hands-on experience with some or several aspects of environmentalism, either in a lab or in the field. The NEETF estimates that only 1

to 2 percent of American adults have this level of environmental learning (Coyle xiii).

The NEETF/Roper survey attempted to assess whether the public could identify environmental problems and indicate the cause of those problems. The results showed that the public does not have a grasp of basic environmental problems. Each of the studies determined that "Americans have little knowledge about basic environmental facts, underlying science, causes of certain conditions, and important public environmental issues" and that "only one-third of American adults can pass a simple test of environmental knowledge with a grade equivalent to A, B, or C" (Coyle 3).

Another disturbing discovery is that between people who finished high school before 1970 when environmental education was rare in public schools and people who completed high school after 1990 when many schools had adopted some type of environmental education program, there was no improvement in quiz scores (Coyle 3).

Perhaps due to increased isolation and insulation of people from the outdoors, environmental literacy appears to be at an all-time low. However, efforts to increase human interaction with and understanding of nature have been burgeoning for a hundred years or more. A small number of people saw the disengagement between humans and their environment, and that small number has continued to grow.

History of Environmental Education

It is important to know that, despite the misconception held by some educators today that environmental education is new and innovative, environmental education has existed in some form for many years.

The roots of formal nature study in the United States go back as far as the early 1900s and the newfound conservation movement that was taking place. The turn of the century was filled with environmental initiatives. For instance, President Theodore Roosevelt's enthusiasm for conservation led to a 1908 White House conference, resulting in the establishment of the National Conservation Commission. This was the first ever presidentially-appointed environmental initiative. Forester and author Aldo Leopold gained recognition during this period for his moving essays, and his words helped awaken Americans to the importance of conserving various natural resources. Land was designated to schools for the purpose of nature instruction, and camps such as the YMCA used outdoor recreation as a way to provide young people with a better understanding of the natural world (Athman and Monroe 4).

This was also the time of John Dewey and his progressive educational reform. Dewey believed that experiential learning was vital to true mastery of a subject. Dewey's "learning by doing" attitude, combined with an awareness of the relationship between humans and the natural world, would later be the core of environmental education. In fact, the nature study movement that developed out

of conservationism contributed some of the principles that are still used, such as inquiry and discovery coupled with hands-on observation (Athman and Monroe 4).

An interest in more formal conservation education did not come about until after World War II when an effort was made by state and federal governments to adopt programs that would teach young people to use natural resources wisely. This effort was well intentioned, but it did not have enough popular support to successfully convey the message of urgency about the human impact on nature that many conservationists would have preferred (Disinger 2).

Little was accomplished until the 1960s. That decade finally saw increased public concern about the state of the natural world, brought about in no small part by Rachel Carson and her landmark book Silent Spring. This cautionary tale depicts a world ravaged by the toxicity of agricultural pesticides. Carson, a biologist with a talent for powerful prose, awakened the world to the power and potential dangers of technological advancement, and as a result of her book, the pesticide DDT was closely scrutinized by the federal government and was eventually banned ("The Story of Silent Spring").

In addition to pesticides, the nuclear testing of the time gave rise to concerns about the environmental impact by "unseen forces," and the public was becoming more prepared to engage in environmental activism. This increased public awareness led to a renewed interest in nature and environmental studies in schools. Proponents of increased environmental education in schools argued that educators "should draw upon [the public environmental movement], and should

contribute to it by preparing young citizens to take part in and improve the political system..." (Disinger 2).

This decade was active for the development of environmental education as a recognized discipline. The first formal definition of environmental education came in 1969 from William Stapp, a pioneer of American environmental education, who said 'environmental education is aimed at producing a citizenry that is knowledgeable about the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution' (Disinger 2).

By the 1970s all this had come to a head and this environmental consciousness had reached mainstream America. The first Earth Day took place in 1970 and it marked an unprecedented level of public interest in environmental issues. for a change in current practices relating to natural resources and nature as a whole; this change involved a shift in education from instruction *about* nature to instruction *for* nature (Athman and Monroe 4).

A similar movement was occurring on an international scale. In the 1970s several major international events secured environmental education as a permanent part of instruction in many nations. In 1972 in Stockholm, Sweden, the United Nations Conference on the Human Environment declared that "education in environmental matters for the younger generation as well as adults ...giving due consideration for the underprivileged is essential" (Palmer 7). This endorsement

greatly increased the prestige of environmental instruction and the perception of its importance by the public.

Shortly after Stockholm, the United Nations Environment Program (UNEP) was established, and in 1975 the UNEP joined with the already established United Nations Educational, Scientific, and Cultural Organization (UNESCO) to found the International Environmental Education Program (IEEP) (Palmer 7). Also in 1975 at a conference in the former Yugoslavia, The Belgrade Charter was adopted which provided a universal goal for environmental education. It states:

'The goal of environmental education is to develop a world population that is aware of, and concerned about, the total environment and its associated problems, and which has the knowledge, attitudes, skills, motivation, and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones' (Athman and Monroe 4).

Besides convincing educators of the importance of environmental education, the Belgrade conference encouraged its participants to compel governmental debate and reform (Palmer 8). This effort to involve governmental officials in environmental education efforts came about in 1977 at the UNESCO First Inter-government Conference on Environmental Education. Representatives of 66 member nations gathered in Tbilisi, Georgia, USSR, and the result was the establishment of international guidelines for formal and informal environmental education programs worldwide (Palmer 8).

In addition to creating universal standards for environmental instruction, the Tbilisi Conference produced three goals of environmental education. Those goals are:

- to foster clear awareness of, and concern about, economic, social, political and ecological inter-dependence in urban and rural areas
- to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment
- to create new patterns of behavior of individuals, groups, and society as a whole, towards the environment (Palmer 12)

Efforts continued at the international level throughout the 1980s to raise environmental awareness and to encourage environmental education. A major initiative that came out of this decade was the development of the World Conservation Strategy, a document that reinforces the message of global concern about the environment and that urges environmentally sustainable practices. In a chapter about environmental education, the World Conservation Strategy states that 'the long term task of environmental education [is] to foster or reinforce attitudes and behavior, compatible with a new ethic' (Palmer 16).

The passing of the National Environmental Education Act in 1970 in the United States echoed the public interest in the promotion of environmental awareness (Athman and Monroe 5). The law established the Office of Environmental Education (OEE), which later became an office of the Department of

Education after the latter's formation in 1979. OEE awarded grants to develop environmental education curricula and provide professional development for teachers (Athman and Monroe 5).

In the United States, however, the 1980s and 1990s represented a “societal backlash” against the green movement of the previous decades (Disinger 5).

Environmental education did not see great advancements during this time, in part because of its critics. In 1992 Economist Jo Kwong charged that environmental education in elementary and secondary schools ‘is often based on emotionalism, myths, and misinformation” and “typically fails to teach about basic economics or basic decision-making processes’ (Disinger 5). A 1996 book called Facts, Not Fear assailed both the practices and the motives of environmental education in the classroom, arguing that it contained ‘emotional-laden pro-environmental pitches designed to foster irrational alarm about improbable environmental disasters’ and that environmental educators sought to ‘impose environmental values on impressionable school children by frightening them with overstated worst-case scenarios’ (Disinger 5). These opposing voices, despite allegations by environmental educators that they were embellished and inflammatory, were given weight by the media and by the United States Congress and states legislatures.

Despite criticism and setbacks to the environmental education movement, the United Nations Conference on Environment and Development – The Earth Summit – was held in Rio de Janeiro, Brazil, in June of 1992. This global event

gave environment issues the spotlight and garnered enough public support to keep environmental education programs running.

The National Environmental Education Act was revised and updated in 1990. The 1990 Act reinforced the principles of the 1970 Act, but it distinguished between formal (school) and informal (outside of school) means of environmental education, placing the primary burden of environmental education on schools. The updated legislation focused on schools as a suitable place for the majority of environmental education while emphasizing the importance of “non-formal avenues for educating citizens, communities and the workforce” (Athman and Monroe 5).

Given all this history, environmental education in the United States in 2006 is generally characterized as broad but shallow. Countless programs exist throughout the country; some programs are folded into the school curriculum while others are after school or summer opportunities. Despite the number of courses and programs offered, most of them rely merely on the dissemination of information as the primary means of instruction. They fail to demonstrate the inherent interconnectedness of the principles of environmental education and to show students the relationships between the choices that they make and the effect that those choices have on every other living thing. Without a national mandate or standard and without increased funding, environmental education continues to be a marginalized discipline.

Current Types and Standards of Environmental Education

Environmental education programs take many forms: they can be formal or informal, they can take place indoors or outdoors, and they can have many students or as few as one. The maxim “all education is environmental education” is frequently used among environmental educators, and it is meant to bring to light the idea that whether people choose to recognize it or not, everything is dependent on the human relationship to nature. Every lesson a child learns, whether in school or from his or her parents or peers, serves to teach that the child is a part of or apart from the natural world (Stone and Barlow Foreword xi).

The availability of environmental programs varies from region to region. David Elder assesses a typical student’s exposure to environmental education in his book A Field Guide to Environmental Literacy. He determines that, in general, students receive an education about the environment that is not coherent and that does not build on prior knowledge (22). Some of the unconnected learning that occurs for students about the environment takes place in the following ways:

- several field trips at an early age to local nature centers or outdoors, in school and as part of a youth group such as Girl Scouts or 4H
- an Earth Day project for several years
- a rainforest project in fourth grade
- a few environmental specials on TV, focused primarily on nature or issues
- a unit on ecology in high school biology class

- a short-term community service activity cleaning up a pond, beach or trail
- a few literature books in English class that relate to the environment
- some random exposure through zoos, aquaria, museums and parks
- limited study of specific environmental issues during social studies classes
- one college course related to the environment

Some students get much more than the experiences described above, but many get much less. The majority of America's students receive a "patchwork of exposure that falls significantly short of what is needed to become environmentally literate" (22). Although the involvement for most students is less than one might expect, there are many stimulating programs, some of which change the course of the participants' lives.

In urban areas where juvenile crime, violence and mischief increase during the after-school hours, after-school programs have met with some success. These programs allow students to plant flowers and shrubs in local parks and to generally beautify public areas. Students travel to zoos gardens, and in some cases students are permitted to work on nearby farms. Opportunities such as these increase the exposure that many young people have to positive adult role models, and they allow participants the chance to improve their own communities. More than simply keeping kids off the streets, these programs provide opportunities for community service, mentoring, student-centered learning, and

parent involvement. They also allow productive use of community and educational resources such as parks, nature centers, museums and botanical gardens (Using Environment-Based Education to Advance Learning Skills and Character Development 6).

Other programs, such as EnvironMentors in Washington, DC focus on disadvantaged high school students from districts in which fewer than 25% of the students graduate and go on to college. This program allows its participants to work one-on-one with environmental professionals and it gives these students an opportunity to see the practical application of knowledge in a vocation (Using Environment-Based Education... 7).

Although the goals of most informal environmental programs are the same as formal programs – to develop environmentally literate young people and adults – the intent of the informal programs is to serve to “complement and enhance” formal environmental education (“Report Assessing Environmental Education in the United States and the Implementation of the National Environmental Education Act of 1990” 10).

Diversity in the implementation of environmental instruction is among the greatest strengths of environmental education today because it allows organizations, institutions and individuals the freedom to incorporate environmental instruction in ways that give the students lessons that are relevant and appropriate. The lack of any overriding standards in environmental education is problematic, however, because it makes environmental education difficult to

explain to education officials and governing bodies when making a case for more environmental education programs, more training in environmental education for teachers, and more funding for the subject.

International organizations such as the United Nations Educational, Scientific, and Cultural Organization (UNESCO) and the International Environmental Education Program (IEEP) have made efforts to align the goals of environmental education worldwide. Many national organizations such as the North American Association for Environmental Education (NAAEE), the Council for Environmental Education (CEE), the National Environmental Education & Training Foundation (NEETF), and the National Education & Environment Partnership (NEEP) have established guidelines for effective environmental education. Most state departments of education in America have adopted their own standards and suggestions for incorporating environment-based instruction in classroom lessons.

Yet, despite the efforts of these organizations and governing institutions to provide structure within the discipline of environmental education, there remains no strong state or federal push to implement formal environmental programs, and there is no established method for assessing environmental knowledge at any level of education.

Although many state departments of education do require some instruction about the environment, most of the requirements that exist for environmental education in K-12 instruction have an "indefinite and nonbinding status" (Woolman 5). For example, in a 1971 major policy statement, the New York State Board of

Regents issued the following commitment to environmental education: "That a student upon leaving the educational system has a set of values that leads him to accept his responsibility toward his natural surroundings and view the primary role of man as being a participant rather than a master of his natural surroundings" (New York State Education Department). Not only is the decree not specific to any grade level or subject area, but most teachers likely do not know that the statement was ever issued.

The United States Department of Education was presented with options for environmental education guidelines in 1996 that were outlined in a publication called Environmental Education Materials: Guidelines for Excellence under the guidance of Dr. Bora Simmons, Professor of Environmental Education at Northern Illinois University.

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grade level or subject area, but most teachers likely do not know that the statement was ever issued.

In December of 1996, a report called the "Report Assessing Environmental Education in the United States and the Implementation of the National Environmental Education Act of 1990" was presented to the United States Congress. Prepared by the National Environmental Education Advisory Council with assistance from the NAAEE, the report provides a comprehensive look at the current status of environmental education in the United States. The report also offers eight specific recommendations to Congress for strengthening and improving environmental education at the national, state and local levels.

- "environmental education is not a clear priority at any level within our education system or society" and that many programs "face on-going resource, funding and staff limitations (20). This recommendation goes on to say that due to the lack of environmental education in mainstream education that there needs to be "clear and consistent political and legislative support" for this subject.
- federal leadership is required, but that its role should be to support outstanding initiatives at the state, local and, in the case of Native American programs, at the tribal level.
- forge stronger partnerships "across federal agencies, within EPA, among nonprofits, schools, and business, and between the public and

private sectors” in order to provide the resources and to help absorb the cost for additional environmental education programs.

- create professional development opportunities for teachers and other environmental educators.
- integrate environmental education into education reform. Rather than convincing educators and students that environmental education is important, those in support of it must convince state education agencies and local school boards that it is a critical and overlooked component of citizen education, science literacy, career development and other initiatives.
- widen the audience in order to reach important groups that are being missed, namely “adults, people of color, low-income populations and senior citizens.”
- increase and improve evaluation and assessment of current environmental education programs. Many questions about environmental education practices must be answered, such as “What works in environmental education? What types of training programs for teachers and [informal] educators and which environmental education materials are most effective and why? What does it mean to be environmentally literate? How do educators gain greater access to quality materials? Where are the gaps in materials and programs?”

- increase the number of environmental professionals and environmental experts in the workforce. Engineers, business leaders, lawyers and city planners should all have representatives with a background in environmental studies. An increase in the number of training opportunities in “environmental studies, environmental engineering, environmental design, environmental management and conservation biology,” among others, would allow for more “informed and responsible decisions about the environment.” In addition, more efforts to infuse environmental education into traditional coursework would create a population that is better informed about environmental matters.

The current state of environmental education in the United States is, as the report indicates, disparate and inadequate. Informal programs must remain to enhance and enrich knowledge about the environment, but the foundations of environmental education must be provided in schools. There is a need for connecting people to the world around them. Environmental education does not yet make that connection, but improved methods of teaching this subject combined with a greater effort to implement these methods is all that is required for changes to start right away.

Recommendation for Effective Implementation of Environmental Education in Schools

Since 1995, nearly every state department of education requires some type of environmental education program, but few states have comprehensive programs that build on previous knowledge and that measurably improve environmental literacy (Ruskey 1). Environmental literacy is the mark of success in environmental education. What, then, are the characteristics of a successful environmental education program?

Ideally, environmental education takes place consistently over the course of a student's life and the content changes and adapts to the student's academic abilities. This type of academic reform would require radical changes to current education practices. There are several approaches that have been implemented in schools already. The "course supplement" approach essentially requires teaching all environmental issues as a separate lesson or unit. The teacher does not necessarily attempt to tie the material into the regular course material. This usually occurs in science class, and although the lessons are often engaging for students, they are often lacking in frequency and in relevance (Elder 53).

The "infusion approach" involves imbedding environmental learning into the curricula of all possible subjects. An English teacher might teach Thoreau, a math teacher might calculate carrying capacity, and a chemistry teacher might perform water quality tests. These lessons can be highly effective, but they usually do not

go far enough in demonstrating the need for fundamental change in how people view their relationship with nature (Elder 53).

Because man's role in nature is an issue that is increasingly important for young people with respect to their futures, their values, and their daily choices, the inclusion of an interdisciplinary environmental studies course is both timely and visionary.

The course proposal made in this paper presumes a "stand alone" course, which is one focuses entirely on the environment. This approach encompasses the most comprehensive and integrated environmental instruction that can be accomplished without dramatic changes to public education policy. In order to incorporate more sophisticated arguments and more advanced content, this particular course is designed for students in 11th or 12th grade. Upon successful completion of this course, students will come to learn and appreciate the scientific implications of the impact humans have on the environment. Students will also experience the responses humans have had toward nature and toward human treatment of nature, ranging from reverence to outrage.

The scope and complexity of much of the content requires that this course be team taught by at least two teachers from two separate disciplines (due to the scientific nature of the ecological components of the course, one of the teachers should be a science teacher or have a strong background in science).

This stand alone model does have weaknesses; it does not build on previous knowledge or experience from prior instruction. This is not a failing of the course

but of the current educational system. If at some point more environmental education were offered at grades leading up to the stand alone course, the course would only be improved.

Perhaps the most problematic attribute of the stand alone approach is that, as its own class, it gives environmental education the appearance of a separate and distinct subject rather than one that is connected to all other courses in the students' schools. It is therefore the task of the teachers to demonstrate connections to the rest of the curriculum and to show students the relevance of the course to their lives. Despite the limitations of this approach, it is the most comprehensive method that is feasible by most school districts at this time.

Many environmental institutions and governmental organizations have spent considerable time and money determining the weaknesses in current environmental education practices (as outlined earlier in this paper) but few of them have organized a practical method for the immediate implementation of environmental programs in schools. In using the guidelines and recommendations of the National Environmental Education Advisory Council, the United Nations Educational, Scientific and Cultural Organization, the National Environmental Education & Training Foundation and others, I have prepared a functional plan for a course in environmental education that can be put into operation by teachers and administrators without sweeping environmental reform by state departments of education. Because little or no formal environmental education exists in most schools, I have done this by incorporating the three components that I believe are

at the heart of quality environmental education: interdisciplinary instruction; place-based, experiential learning; and adequate teacher training as a guiding principals.

Interdisciplinary instruction is crucial since all environmental instruction is inherently interconnected. I have selected seven important components that will be addressed in the course: science, language arts, history, economics, current events, environmental ethics, and sustainability. Sometimes these subjects will be introduced as individual topics within the course, but teachers with training in environmental education will skillfully demonstrate the connections between the disciplines. While studying water quality, for example, the teacher(s) might select an excerpt from Thoreau's Walden in which the pond and Thoreau's relationship with it is a central theme.

The next area that is indispensable to quality environmental education and that I propose be included in this course is place-based, experiential learning. This area of study uses local wilderness – streams, lakes, trees, wildlife, or whatever outdoor venue is available, as a place for classroom study. Students will learn about and develop a connection to their own region, which will foster a greater appreciation for nature. Administrators often react to this style and format of teaching with skepticism and sometimes resistance, because it brings students out of the classroom. Nevertheless, it is important that teachers emphasize the educational benefits of hands-on learning and that they make this type of instruction an integral part of this course.

Finally, teachers must be allowed to grow in the field of environmental education. Any teacher who takes on an environmental course such as the one presented in this paper must actively seek out professional development opportunities. These might come in the form of conferences, workshops, classes or wilderness activities. Because environmental education is a field that is without strong institutional support, the best, most capable educators in every school must be its representatives.

These three features – interdisciplinary education; placed-based, experiential learning; and teacher training – are the features that I have determined to be the most valuable to environmental education. I believe that when used together in the course they will provide the most comprehensive and the most desirable type of learning.

Interdisciplinary Instruction

Most school curricula are increasingly burdened by state mandates and required material that make any elective subject matter less likely to appear in a teacher's lesson. Because covering the requisite material in the time allotted is difficult, environmental education often takes a back seat even for teachers who value environmental education. Another factor that has prevented environmental education from being easily folded into most K-12 curricula is the interrelated nature of environmental instruction.

Subjects are usually taught as isolated disciplines – language, science, social studies and math. Environmental education is multidisciplinary, meaning it is a combination of every subject currently studied, and interdisciplinary, because the subjects are overlapping and connecting. Everything humans do either affects the natural world or is the effect of the natural world. This systemic thinking goes against the traditional educational paradigm, which focuses on the individual parts of the world rather than “the structure, patterns and relationships that define how society and the environment function” (Elder 51). In his book A Sand County Almanac, Aldo Leopold says, “Education, I fear, is learning to see one thing by going blind to another” (158). It is the goal of interdisciplinary environmental education as it is applied in the course described in this paper to look at the big picture and to see the connections and relationships that sustain all life.

Fundamental to adopting effective teaching strategies for environmental education is to understand how and why environmental education is different from

other disciplines. Much of public education in the United States has been reduced to facts and skills, the mastery of which can be demonstrated on standardized tests. Likewise, "media efforts in environmental education have focused on heightened awareness rather than on participation" (McConney and McConney 4).

Current environmental education in K-12 classes is conducted primarily in science classes. Facts about ecosystems and food webs and pollution are incorporated into science lessons and labs. Some schools offer an environmental science course as an option at the secondary level, and these courses go into great detail about land use and population and energy and sustainability. While an environmental science course provides an excellent foundation for environmental education, it does not usually give students anywhere to go with that information. Awareness and knowledge of facts comprises only a portion of the overall goals of environmental education. The course proposed here will seek to explore attitudes and behaviors and principles in addition to addressing the factual information that is required for environmental literacy.

Environmental literacy, by definition, involves "responsible environmental behavior". In order to achieve this change in students' behavior, educators must adopt different strategies. Teachers of environmental education cannot assess student behavior outside of the classroom, and in the proposed course they must attempt to shape the way students see themselves in the world and how they measure their own impact on it. A convention in environmental education is to attempt to teach students "how to think" and not "what to think", which will be the

aim of the instruction recommended in this paper (Athman and Monroe 7). Rather than train students to behave in a particular way in a particular situation, teachers will try to “help learners form the capacity to collect and analyze information, make informed decisions, and participate fully in civic life” (Athman and Monroe 7). In order to do this, students must be armed with more than information about ecological processes and systems and a vague appreciation for the environment. Environmental education goes beyond disseminating information. The end goal of environmental education is not merely a well-informed citizen but “a citizen with a different set of behaviors and values than the current norm” (Elder 51). This goal of behavior change is an important factor in what makes environmental education different from other subjects. Teaching students to change the way they think involves moving them from being recipients of information to being discoverers and conveyors of information.

Joy Palmer creates a hierarchy of different types of environmental education in which she shows how environmental education models range from a traditional, teacher-centered method to a more student-centered, activist approach. She establishes three distinct levels of learning: positivist, interpretivist and critical. The positivist level, which is the lowest level, involves traditional methods of learning with information coming in the form of “knowledge” and with students as “passive recipients” of this information (Table 1). The interpretivist level increases student level of participation and also requires that students interpret information rather than simply regurgitate prepared solutions to questions and problems (Table

1). Palmer's highest level, called the critical level, calls upon students to be socially active problem solvers. They use scientific information to affect positive environmental change in their communities and beyond. This type of interdisciplinary approach provides students with "the opportunity to make their own decisions and think more critically about their choices..." (Athman and Monroe 7).

Many environmental education courses that incorporate interdisciplinary instruction, student participation, and activism into the class have seen notable improvements in academic achievement, attitude and behavior by students. The State Education and Environmental Roundtable (SEER) is a collaboration of twelve state education agencies that, in 1998, performed a study on the impact of environmental instruction as an instrument for improved academic performance and behavior in grades K-12 (Environment-Based Education...13). Closing the Achievement Gap: Using the Environment as an Integrating Context for Learning is the report that resulted from the SEER study, and the report describes environmental education efforts at forty different schools in twelve states. Although the programs varied in many ways, "all used the environment as an 'integrating context' – for science, math, social studies and language arts" (Environment-Based Education...13). The report notes significant improvements in test scores after the environmental education programs were implemented and perhaps just as importantly "enthusiasm and the desire to both learn and teach increased in each of the studied schools" (Environment-Based Education...13).

The interdisciplinary components described here provide a sampling of the breadth of environmental education. Specific themes, texts, authors, historical figures and events are discussed, but a specific syllabus is not provided because a specific environmental curriculum is organic. The environmental issues and the natural systems of the region in which it is taught are the motivating factors in developing the complete curriculum. The course outlined in this paper is planned and organized with the idea that individual teachers will modify the content to fit the students and community they serve. (See Appendix 2 for a formal course proposal).

The following seven sections describe specific components that I believe work together to form a comprehensive interdisciplinary environmental education foundation.

Science

Without the fundamental science of environmental studies, students will not see the need for further investigation into matters that relate to the environment. For example, if students are not aware of the important ecological role that wetlands play (providing food and habitats for fish and migratory waterfowl, improving water quality by filtering, diluting and degrading toxic wastes, reducing flooding and erosion by absorbing stormwater, etc.), then they will not see the need to protect wetlands (Miller 164-165).

Within the environmental science component, students in this course will learn the scientific basis of environmental issues. Students will explore the subject of planet overpopulation. They will learn about the relative smallness of the planet earth relative to human consumption. The current debate about genetically engineered and genetically modified grains and animals will be discussed from a scientific and from an ethical perspective. Issues of the availability of water (fresh and sea) will be addressed in the course as well as water pollution from agriculture, technology and other industry. Excerpts from Sylvia Earle's *Sea Change* and from Cronin and Kennedy's *The Riverkeepers* will be included in these lessons. Students will assess the scientific impact of the expenditure of energy upon earth systems and cycles. There will be an emphasis on consumption vs. conservation and on standard of living vs. quality of life. Throughout this unit, recent studies about energy use and conservation will be incorporated into the curriculum. Short selections of prose will be read as the literary component of this

section, such as Don DeLillo's "Airborne Toxic Event". Environmental issues - global warming, water depletion and air quality - all have scientific roots. Students will study the science of these issues so that they are better able to make informed decisions.

There are various environmental science textbooks that can be used in this course. These texts, to varying degrees, combine ideas and information from natural sciences (ecology, chemistry and geology) and social sciences (such as economics, politics and ethics). Although any of these textbooks would be sufficient, I have found C. Tyler Miller's text titled Environmental Science to be the most comprehensive and the most accessible to students. Miller's textbook is in its eighth edition, and each new version includes more related articles and essays and other writing that is outside basic scientific content. To keep it up-to-date, the scientific content undergoes its own revisions with each edition. Miller explains that critics of environmental science teachers and textbooks have complained that the subject is often lacking in basic scientific information, that certain topics (such as global warming and ozone depletion) are treated superficially, that environmental issues are sometimes addressed with bias, and that teachers and texts often focus on bad environmental news without offering any good news (Miller iii). Miller, along with many other authors of textbooks, has tried to improve the way students are introduced to the subject and to provide them with a balanced, comprehensive, and factual treatment of environmental science. This

type of reassessment and refining of his work shows Miller's dedication to a complete and evenhanded treatment of environmental science.

Without a doubt, science is the cornerstone of environmental education. Environmental science involves the study of "how we and other species interact with one another and with the nonliving environment (matter and energy)" (Miller 65). Environmental science is perhaps the most important component of the course, because nearly all of the issues and arguments that relate to the environment are rooted in science.

Language and Literature

Reading and writing are vital components to a complete environmental education. Knowing and caring a great deal about the environment is important, but without proper training in writing and speech, one lacks the communication skills necessary to share one's interests, concerns and discoveries with others. Writing down thoughts, observations and concerns about one's relationship to the environment in the form of essays, poems and reports will strengthen students' ties to the natural world.

The nature writing that has shaped and inspired environmental thought for centuries is key to this course, because it synthesizes the scientific and the romantic qualities inherent in nature. Language and literature are subjects that are commonly paired with other subjects. The broad themes and universal lessons in literature lend themselves to the interdisciplinary nature of environmental education. Literature will be used to supplement information and experiences and to provide an opportunity for students to read what they might be feeling but are unable to say. Some works will be selected purely for practical purposes - Roger Tory Peterson's bird guides or books about tracking animals are instructive, specific manuals that have immediate value in the field. Some works will be chosen for their historical significance. Rachel Carson's Silent Spring, for example, in addition to being compelling prose, is a landmark book in environmental history. Some works will be used for their literary prominence, and perhaps no author has received the critical acclaim of Henry David Thoreau. Thoreau's Walden conveys

the principle of living with “simplicity” and of listening to oneself. These sentiments are at the heart of environmental education. The course will use Aldo Leopold’s indispensable A Sand County Almanac for its insightful ecological theory and for its strong poetic sensibility (Leopold xviii). Annie Dillard’s writing will be used to look for meaning in life and to see if nature can tell us how to live (Lyon 334). Edward Abbey will be examined for his masterful and vivid description of life in the wild, foreboding and largely unknown desert landscape. His style is at once “darkly humorous, rippingly satiric, straight-on blunt, and poetically lyrical” and his irreverence makes him immediately appealing to high school-age students (Lyon 346).

There are countless nature writers worthy of study – John Burroughs, John Muir, Barry Lopez, and Henry Beston among others. These works lend themselves to many of disciplines with environmental education. Many literary works take a philosophical position that will be explored, some have historical significance, and some argue for particular political action. All of them stand on their own as works of superior literary achievement that warrant sufficient time and treatment in environmental education.

Language and literature can explore the idealistic, romantic aspects of nature, but they can also be used to tap into unexamined feelings that people have towards the natural world. There is almost no limit to the works of literature and to the kinds of writing that teachers can select from for use in this course.

History

Putting environmental events in a historical context is helpful in deciding how society should make environmental decisions in the future. The environment can be looked at as a historical document: “the chainsaw and the bulldozer make a record that the historian can read just like the printed word” (Nash 2). In turn, the choices that are made today will be read and judged by future generations.

Environmental history is a relatively new field that studies how land shaped people and how people shaped the land (Nash 3). It can cover the entire planet and start as far back as early civilizations, or it can focus on a specific geographic area such as North America studying the civilizations that have made an impact on that continent.

Students will focus on North America, and they will observe the different land use policies and practices that residents of the continent have held from Native Americans to present-day inhabitants. Native Americans have long been regarded as “the first environmentalists” because they “felt themselves part of nature and revered the environment that sustained them” (Nash 9). As early as 1626, though, a conservation impulse by a few European settlers took place, and Plymouth Colony passed an ordinance regulating the cutting and sale of timber on colony lands (Nash xi). Since that first ordinance, some humans have continued to impose restrictions and limitations on hunting and logging and use that adversely affected their territory. For many years, the vastness of North America allowed for continued westward expansion. By 1832, a national park was proposed by George

Catlin and in 1864 Yosemite Valley was reserved as a state park in California (later Yosemite National Park) (Nash xi-xii). Countless conservation efforts have occurred over the past centuries, most of them were not widely accepted, and many of them were contentious.

Other important figures and events in environmental history will help illustrate for students the concerns that have been voiced for centuries by conservationists and environmentalists. For example, Gifford Pinchot was the first professional forester in the United States, and he is considered by many to be the most prominent figure of the American conservation movement. The administration of Theodore Roosevelt represents landmark contributions by the White House to environmental preservation and improvement. Paul Ehrlich's 1968 book The Population Bomb brought widespread attention to population density issues. Not only will the history of the environment provide students with a background in these issues, but students will be better able to look ahead to what issues might require action and attention in the future.

Students, in examining this environmental history, will determine what political and philosophical values were at issue. Often the concept of individual freedom comes into conflict with environmental efforts (Nash 4). Sometimes the representative form of government of the United States has been an obstacle to American environmentalism. Elected officials and scientists sometimes know what is best for the environment "but persuading the people to apply this knowledge is difficult" (Nash 5). Students in this course will investigate instances when

proposed environmental legislation was not passed because it did not have popular support. Any student interested in being a better steward of the earth “can benefit from the problems his or her predecessors faced and how they formulated ideas for reform, secured the public approval necessary for their institutionalization, and evaluated their effects” (Nash 7-8).

Students must therefore have a clear understanding of the environmental practices that have existed and that still exist today. This understanding will provide students with a clear picture of how to create and establish future strategies for environmental sustainability.

Politics and Current Events

Politics can play an important role in environmental education. Although it is a relatively new and therefore unexplored area of environmental studies, students will examine the environmental degradation that certain groups of people are forced to endure. Poor people and ethnic minorities are routinely the recipients of air and water that is below minimum safety standards.

In addition, students will explore works such as Gary Snyder's "The Politics of Ethnopoetics" which examines the link between the disintegration of cultural diversity and ecological destruction. Finally, this component of the course will examine the political and economic aspects of globalization that students will become acquainted with throughout the course.

Students, in studying and evaluating environmental laws and policies, will learn about the causes and effects of environmental legislation. They will see what environmental action has been taken in their community, their state, their country, and around the world. Classroom discussions will become forums for the sharing and the solving of environmental problems and concerns. Issues of environmental justice, of changes in governmental policies and of general human behavior should be topics of discussion and the basis for class projects.

Environmental education is often controversial, and when politics enters the classroom discussion, it is easy for students to become defensive or upset. It is the role of the environmental educator to encourage as many points of view as students wish to express but to always distinguish between facts and opinions

("Guidelines for the Initial Preparation of Environmental Educators" 19). It is also important for the teacher to withhold his or her personal point of view about environmental issues, conditions or actions ("Guidelines..." 18).

One potential weakness of an environmental education curriculum is an over-reliance on established materials for course reading and study. The wealth of essays, articles, information and facts already compiled in textbooks is astounding, and a teacher might feel bound to use every last page of a chosen book. With limited instruction time and with a wealth of established texts available, teachers might not seek more current sources. One component of an environmental education course that must not be overlooked in this course is a discussion and an analysis by students of the everyday events that have an obvious or a tangential relationship to the environment. News broadcasts, magazine and newspaper articles, and local events (construction developments, wetland preservation, etc.) are all relevant sources for class lessons and discussions.

A perfect example of the use of compelling, present-day issues to shape lessons and to demonstrate the interwoven threads of environmental issues is the Gulf Coast hurricane tragedy of 2005. Hurricanes Katrina and Rita were devastating to communities and families, and those images were immediately available to people on televisions, computers, in newspapers and magazines. What many people have not considered, and what has received less media attention, are the environmental impacts, both short-term and long-term of the hurricanes.

This look at news from an environmental point of view can be large-scale or local. In 2006, upstate New York saw record-level rainfall and flooding. Students can find out if agricultural runoff has contributed to polluted waterways and water sources.

Some inclusion of current events at all levels, local, national and global, is important in keeping students informed and in demonstrating the relevance of the issues studied in this class.

Economics

The world economy continues to grow, and development and consumption by humans increases. Some of the harshest critics of environmentalism argue that environmentally sustainable practices and a thriving economy are mutually exclusive. Part of environmental education is demonstrating ways in which a healthy environment and a strong economy are both possible. The purpose of this concentration is to teach students how to apply the principles and methods of economics to real world environmental problems.

Economic trends of the last century have rendered the planet with an environmental deficit. Because “none of today’s industrial economies are truly sustainable,” experts in environmentally sustainable development such as Lester Brown suggest that the coming years must be about creating a balance between the environment and the economy (State of the World 2004 101). In his book Eco-Economy, Brown identifies areas of greatest environmental concern – agriculture, energy, materials and population density (Brown xii-xiii). Brown offers suggestions, some minor and some drastic, for governments and citizens to change the ways they eat and live and buy.

There are also some long-term and less obvious environmental occurrences that might be devastating to the global economy. Global warming and its effects (increase in hurricane force, drought, flooding) might be the biggest drain to the world economy in years to come. Janet Abramovitz conducted a study of natural disaster costs during the 1990s, well before the Gulf Coast devastation of 2005,

and she determined that more than \$608 billion in losses were accrued in that decade (Worldwatch Institute). Disaster planning is a practice recommended by Abramovitz and other scientists and environmentalists. It is measured that on average every \$1 invested in disaster preparedness saves \$7 in disaster recovery costs (Worldwatch Institute). All that is lacking is for governments and communities to give up short-term economic planning for long-term economic security.

Environmental economists have provided arguments for more sustainable environmental practices that would render stronger, more sustainable economies. Because economic and environmental sustainability go hand in hand, economic theory and practices must be incorporated into this environmental education curriculum.

Ethics

The philosophical questions that relate to the environment are ethical ones. The questions that are asked, “What does it mean to be a moral person? What is the nature of morality and why do we need it? What is the relationship between morality and law? What is the relationship between morality and ethics?” are all questions that can be applied to a person’s relationship with nature. Louis J. Pojman in his book Environmental Ethics examines many works of literary and scholarly significance with respect to environmental theory and practical application. Pojman says that environmental ethics looks at global morality and at “humanity’s relationship to the environment, its understanding of and responsibility to nature, and its obligations to leave some of nature’s resources to posterity” (Pojman 1). The text contains essays and excerpts that Pojman has divided into separate areas of environmental concern. Part of the text examines ecological attitudes from different cultures. A look at western versus non-western relationships with the natural world is important in establishing a foundation for environmental thought. Students should know that, whatever they choose to believe, other people often harbor different attitudes. Knowing other’s beliefs can be useful in understanding one’s own values. Other essays assess the value of nature. The writings offer various attitudes – biocentric and ecocentric – that prompt the reader to question the value that he or she places on nature (see Appendix 3 for a sample unit plan on this topic). Many of the essays offer an ethical treatment of issues and subjects that students will have studied in class –

population, pollution, pesticides, economics, animal rights and sustainability. This integration of the philosophical and practical arguments that are inherent to environmental studies is crucial to a complete environmental education.

The Pojman text is a valuable tool in approaching environmental ethics because it organizes and compiles valuable insights and observations, but teachers and students should apply ethical arguments to literature and situations outside of a textbook. Once students have been taught to put actions and behaviors in a moral context, they are better able to assess their own approval or disapproval or those actions and behaviors.

Sustainability

Sustainability education, also called “education for sustainable development,” is considered by some to be the next generation of environmental education. It seeks to bring together various aspects of environmental fields, such as “systems thinking, ecological economics, nature study, global education, civics, environmental design, and others” (Elder 55). The characteristic that distinguishes SE from other approaches to environmental education is “a focus on the search for solutions” (Elder 55). This type of education involves a type of future orientation that “goes beyond investigation of problems to engage students in envisioning the future in a different way” (Elder 55). Rather than being a subject area or a body of thought, sustainability education is a way of thinking.

Albert Einstein famously said, “No problem can be solved from the same level of consciousness that created it.” This sentiment is echoed by Lester W. Milbrath, author of books and articles that relate to sustainability, who believes that present-day society is not capable of producing a solution to the current lack of environmental sustainability because of the values that are held by those in power – “economic growth, jobs, consumption, competitiveness, power, and domination” (Miller 56). Milbrath believes that “we must learn our way” to a sustainable society and to create a new vision of the future (Miller 56). It is with this look toward the future that sustainability education would be incorporated into this model of environmental education.

Place-Based and Experiential Learning

To most students, the idea of going outside the classroom for any class other than gym is probably unheard of. Classrooms across the country are virtually indistinguishable from one another and students, while they might be comforted by the familiarity of the four walls of the room, do not interact with any part of the natural world most of the day. This was not always the vision that educators had for students. More than a century ago, John Dewey recommended immersing students in the local environment: "We cannot overlook the importance for educational purposes of the close and intimate acquaintances got with nature at first hand, with real things and materials, with the actual processes of their manipulations, and the knowledge of their special necessities and uses. In all this there [is] continual training of observation, of ingenuity, constructive imagination, of logical thought, and of the sense of reality acquired through firsthand contact with actualities" (Stone and Barlow 90-91).

For most of human history, people enjoyed an "intimate ecological relationship to their local landscapes" and they were dependent on the land for "food, clothing, shelter, medicine, energy, [and] water..." (Leslie, Tallmadge and Wessels 29). "Nature" and "wilderness" were not something separate or something outside the scope of perception. The fact that modern society has terms that distinguish the landscape from humans is evidence "of our own separation from the sustaining land" (Leslie, Tallmadge and Wessels 29). The urbanization and suburbanization of so many people has encouraged this

misconception that nature is something that is “out there.” When people think of nature they tend to think of great expanses of trees or majestic mountains. Rarely do people consider the black walnut tree or the white pine that is in their backyard or that sits in the park down the street as part of nature as well.

Place-based learning is a concept that encourages the exploration and understanding of nature and natural systems just outside the doors of one’s house or school. David Sobel, Director of Teacher Certification Programs in the Education Department at Antioch New England Graduate School, explains:

Place-based education is the process of using the local community and environment as a starting point to teach concepts in language arts, mathematics, social studies, science, and other subjects across the curriculum. Emphasizing hands-on, real-world learning experiences, this approach to education increases academic achievement, helps students develop stronger ties to their community, enhances students’ appreciation for the natural world, and creates a heightened commitment to serving as active, contributing citizens. Community vitality and environmental quality are improved through the active engagement of local citizens, community organizations, and environmental resources in the life of the school (Sobel 7).

For too many students, thinking about the environment means thinking about problems that are too far away or too enormous to be relevant. Rainforests and wildlife extinction are important topics that should be addressed in school, but

that vision of nature should be secondary to the understanding that students have of nature in their own community.

Various incarnations of place-based education exist at all grade levels, and there are strategies that are used repeatedly to foster a sense of place for students. One strategy that utilizes language arts, drawing, and species observation and identification skills is nature journaling. At the heart of nature journaling is observation. Students are posed a question or asked to draw something or are just directed to put something on paper. Many students complain at first they can't draw well, but the goal is not to create a work of art, it is "to provide visual evidence of what a student has seen and learned" (Leslie, Tallmadge and Wessels 39). Clare Walker Leslie suggests beginning with a specific task such as drawing three very differently shaped leaves or two different insects (42). Often nature journals include general notes such as the date, the weather conditions, or a description of the overall sounds and sights. The nature journal is an adaptable tool, and it can and should be modified to accommodate different students' strengths and interests. For example, some journal entries contain original poetry, some talk about plants or animals, and others examine backyard or schoolyard observations (50). Students can also present portions of their journal to the class to demonstrate the variances in how different people perceive the same things and to develop presentation skills. Nature journals do not require exotic locales or specialized tools. It is a tool of observation that students can take

with them when they are traveling with their families or when they move away and they wish to develop a connection with a new community.

Tom Wessels, Director of the Environmental Biology Program at Antioch New England Graduate School, teaches a different method of acquainting oneself with nearby nature. Wessels's technique generally requires at least a small stand of trees and a dose of deductive reasoning. Without being able to identify the specific species of trees, students can learn to train themselves to understand the heritage of a landscape and to interpret that heritage (Leslie, Tallmadge and Wessels 61). By identifying clues that the trees and the landscape offer, students can determine forest disturbance histories. Some of these disturbances include past logging, fires, abandonment of pastureland, and beaver activity (Wessels 15). Students are on the lookout for scars at the bases of tree trunks, for stone walls, and for variations in the heights of trees which provide clues as to the history of the landscape. As students become more attuned to the details and what they mean, they begin to see the entire story of the land and they see that they are a part of that history. More advanced students will learn the different species of trees and plants, and this will allow them a more complete picture.

A crucial element of place-based learning involves building connections between the school and the community. Sometimes this is as simple as letting a community know what kinds of projects students are engaged in at school. If students are using a place in the community for class, it is important to tell the members of the community that the place has educational value. Oftentimes,

members of the community can be brought in to class or out into the field to act as experts in certain areas. Town historians, biologists, engineers and public works specialists can provide students with valuable information about how their community functions and how they fit in. Inviting members of the community to see what students have created and how students have contributed can allow for new opportunities for students to be active in the community. Students in Gilford, New Hampshire, invited residents of the town to the presentation of the newly improved community access to a nature trail (Sobel 69). This type of shared experience gives students a chance to feel a part of their society. As David Sobel puts it, "Place-based education is about connecting people to people as well as connecting people to nature" (63).

Teacher Preparation

Now that a course structure has been put in place, the issue of teacher preparation must be addressed. Environmental education will not be effective if only a handful of educators are willing and able to incorporate this type of instruction into their classes. Although many teachers might wish to infuse environmental lessons into their curricula, they “often express misgivings about their competence to conduct” such lessons and “have limited opportunities for training before and after entering the classroom” (“Report Assessing”... 21-22). Although there are some good programs to train in-service teachers in environment-based education, these programs are often not readily available (Athman and Monroe 13). Also, most of the in-service training that is available provides little if any coordination among different programs (Ruskey 2). This lack of coordination adds to the fragmentation and inconsistency that has plagued public and professional perception of environmental education in the past. A study by The National Consortium for Environmental Education and Training points to “the low priority that most state education agencies give to environmental education in-service training” as a reason for the lack of teacher competence and confidence (Ruskey 2).

If widespread competence in environmental education instruction is the goal, pre-service training with consistent standards is a way of ensuring quality teacher training. Unfortunately, “the majority of states do not provide environmental education instruction for teacher candidates or pre-service

teachers,” and, in fact, only three states currently have pre-service environmental education teacher training requirements in place (Ruskey 2). Arizona, Wisconsin and Maryland are the three states with declared environmental education requirements; however only one of those three states has managed to achieve full compliance from teacher training colleges (Ruskey 2). Perhaps owing to the limited training opportunities, only about 10% of teachers in the year 2000 had taken courses in environmental training methods and 26% had prior course work in environmental science, ecology or environmental studies (Elder 23).

Despite the lack of training, 83% of elementary teachers, 59% of middle school teachers and 45% of high school teachers include environmental topics in their instruction (Elder 24). Of those elementary and middle school teachers who do teach about the environment in their classes, almost two thirds reported teaching less than fifty hours on the subject out of approximately 1100 teaching hours over the course of a year, amounting to less than 5% of the total teaching time (Elder 24). Although 5% seems like an admirable effort for these teachers, and it is more than most students will spend on art, music or physical education, a mere 50 hours is woefully inadequate for the task of engendering environmentally literate youth.

In an initiative called the National Project for Excellence in Environmental Education in 2000 that was sponsored by the Environmental Protection Agency, the North American Association for Environmental Education (NAAEE) published “Guidelines for the Initial Preparation of Environmental Educators.” This document

provides recommendations for the basic knowledge and abilities that teachers need to provide high quality environmental education. The report identifies six themes in which environmental educators should demonstrate proficiency. The first theme is environmental literacy. The four subcategories within environmental literacy that the guidelines mention are: 1) questioning and analysis skills, 2) knowledge of environmental processes and systems 3) skills for understanding and addressing environmental issues and finally 4) personal and civic responsibility (12). The second theme required for proficiency in teaching environmental education involves the foundations of environmental education. The report states "educators must have a basic understanding of the goals, theory, practice and history of the field of environmental education" (12). Among the foundations addressed are the fundamental characteristics and goals of environmental education, how environmental education is implemented, and the evolution of the field of environmental education (12). Third on the list of guidelines are professional responsibilities of the environmental educator. The top three responsibilities addressed are exemplary environmental education practice, emphasis on education, not advocacy, and ongoing learning and professional development (12). The fourth theme addressed requires the environmental educator to be skilled in the planning and implementing of environmental education programs. The teacher must have a thorough understanding of 1) the knowledge of the learners, 2) the instructional methodologies used in environmental education, 3) available materials and resources, 4) the available and appropriate technologies, 5) the ideal setting

for environmental instruction (13). The fifth theme necessitates the proper fostering for learning about environmental issues. Because environmental education can be controversial and can require deep personal reflection, an environmental educator should provide “an inclusive and collaborative learning environment” and “flexible and responsive instruction” (13). Finally, the sixth guideline asks that environmental educators be strongly committed to making assessment and evaluation integral to instruction. This might involve seeking out opportunities to collaborate with others and to continue to gather new information so that future instruction might be modified and improved (29).

Environmental education is, at its heart, an integrative undertaking. Instructors teach across disciplines, linking the methods and content of various subjects, including natural sciences, economics, language arts and philosophy to help foster a complete understanding of environmental issues and their implications (“Guidelines for the Initial Preparation of Environmental Educators” 9). Through proper training, environmental educators will receive the skills they need to provide quality instruction in this unique field.

Conclusion

Imagine a generation of students who have the economic and environmental background to generate a financial market for environmentally preferable goods and services of every kind: building materials, cleaning products, energy consumption, appliances, food, and every other product that touches consumers' lives. Imagine a population of young people who possess the knowledge and will to infiltrate communities across the country and across the world to help implement solutions for saving endangered species, monitoring air and water quality, documenting toxic releases, and launching new sustainable projects. Imagine a populace with an understanding of their potential environmental impact who are determined to make their communities and their world a little more sustainable by purchasing sustainable products, by voting for political candidates with solid environmental records, and by working for companies with sustainable environmental practices (Elder 58).

A change in the way people view their relationship with the environment does not come quickly, and it does not come easily. For environmental education to be implemented in public schools, as it should be in a comprehensive, multi-level learning experience, dramatic educational reform is required. Currently, environmental education lacks the necessary financial and popular backing by schools and departments of education for that type of sweeping change. When school reform initiatives are proposed, supporters of environmental education will have to justify why this type of instruction is necessary and they will have to

demonstrate that environmental education will actually benefit the environment and improve mainstream education overall. Educators who value environmental instruction and who incorporate environmental education in their classrooms now with a course similar to the one proposed here, will be in a position to explain how environmental education has helped their students. These teachers can explain how their students are more connected to the real world and are more involved citizens are a result of this connection.

Environmental education engages students' minds, hearts and hands. Its methodologies – hands-on experiential learning, integration of different subjects, the development of critical thinking skills and problem solving – are consistent with current practices in education. Students, schools and communities and most importantly the process of learning all benefit when engaging and effective approaches of environment-based learning are brought into the education mainstream.

Table 1

Structure and Practice
Three Images of Environmental Education

	Positivist	Interpretivist	Critical
Purposes			
view of environmental education	knowledge "about the environment"	activities "in the environment"	action "for the environment"
educational purpose	vocational	liberal/progressive	socially critical
learning theory	sometimes behaviorist	constructivist	reconstructivist
Roles			
role of goals of environmental education	externally imposed <u>taken-for-granted</u>	externally derived but often <u>negotiated</u>	critiqued (seen as icons if <u>ideology</u>)
teachers' role	authority-in-knowledge	organizer of experiences in the environment	collaborative <u>participant / inquirer</u>
student's role	passive recipients of disciplinary knowledge	active learners through environmental <u>experiences</u>	active generators of new knowledge
curriculum supporters	disseminators of prepared solutions to environmental <u>problems</u>	external interpreters of the learners' environments	participants in new problem-solving networks
role of texts	pre-existing source of authoritative knowledge about the environment	pre-existing source of guidance about environmental <u>experiences</u>	emergent reports of outcomes of critical environmental inquiries
Knowledge and power			
view of knowledge	preordinate commodity systematic personal objective derived from experts	intuitive semi-structured personal subjective derived from experience	generative/emergent opportunistic collaborative dialectical derived from <u>inquiry</u>
organizing principles (source of authority)	disciplines	personal experience	environmental issues
power relationships	reinforces PR	ambivalent about PR	<u>challenges</u> PR
View of research			
research is	an applied science objectivist instrumental quantitative acontextual/individualistic deterministic	interpretivist subjectivist constructivist qualitative contextual/individualist illuminative	critical social science dialectical reconstructivist qualitative contextual/collaborative <u>emancipatory</u>

Palmer, Joy A. Environmental Education in the 21st Century. New York, NY: Routledge, 1998.

Appendix 1

NEETF/Roper Questions, 1997-2000

Test Your Environmental Knowledge!

1. There are many different kinds of animals and plants, and they live in many different types of environments. What is the word used to describe this idea? Is it...

- a. Multiplicity _____ 6%
- b. Biodiversity _____ 41%
- c. Socio-economics _____ 7%
- d. Evolution _____ 9%
- e. Don't know _____ 36%

2. Carbon monoxide is a major contributor to air pollution in the U.S. Which of the following is the biggest source of carbon monoxide? Is it...

- a. Factories and businesses _____ 25%
- b. People breathing _____ 3%
- c. Motor vehicles _____ 65%
- d. Trees _____ 3%
- e. Don't know _____ 4%

3. How is most of the electricity in the U.S. generated? Is it...

- a. By burning oil, coal, and wood _____ 33%
- b. With nuclear power _____ 12%
- c. Through solar energy _____ 2%
- d. At hydro-electric power plants _____ 39%
- e. Don't know _____ 13%

4. What is the most common cause of pollution of streams, rivers, and oceans? Is it...

- a. Dumping of garbage by cities _____ 14%
- b. Surface water running off yards,
city streets, paved lots and farm fields _____ 28%
- c. Trash washed into the ocean from beaches _____ 4%
- d. Waste dumped by factories _____ 45%
- e. Don't know _____ 9%

5. Which of the following is a renewable resource? Is it...

- a. Oil _____ 12%
- b. Iron ore _____ 4%
- c. Trees _____ 65%
- d. Coal _____ 6%
- e. Don't know _____ 24%

6. Ozone forms a protective layer in the earth's upper atmosphere. What does ozone protect us from? Is it...

- a. Acid rain _____ 4%
- b. Global warming _____ 27%
- c. Sudden changes in temperature _____ 6%
- d. Harmful, cancer-causing sunlight _____ 54%
- e. Don't know _____ 9%

7. Where does most of the garbage in the U.S. end up? Is it in...

- a. Oceans _____ 5%
- b. Incinerators _____ 4%
- c. Recycling centers _____ 4%
- d. Landfills _____ 85%
- e. Don't know _____ 2%

8. What is the name of the primary federal agency that works to protect the environment? Is it the...

- a. Environmental Protection Agency (the EPA) _____ 72%
- b. Department of Health, Environment, and Safety _____ 3%
- c. National Environmental Agency (the NEA) _____ 4%
- d. Federal Pollution Control Agency (the FPCA) _____ 6%
- e. Don't know _____ 15%

9. Which of the following household wastes is considered hazardous waste? Is it...

- a. Plastic packaging _____ 16%
- b. Glass _____ 3%
- c. Batteries _____ 67%
- d. Spoiled food _____ 10%
- e. Don't know _____ 5%

10. What is the most common reason that an animal species becomes extinct? It is because...

- a. Pesticides are killing them _____ 8%
- b. Their habitats are being destroyed by humans _____ 74%
- c. There is too much hunting _____ 6%
- d. There are climate changes that affect them _____ 5%
- e. Don't know _____ 6%

11. Scientists have not determined the best solution for disposing of nuclear waste. In the U.S., what do we do with it now? Do we...

- a. Use it as nuclear fuel _____ 7%
- b. Sell it to other countries _____ 3%
- c. Dump it in landfills _____ 12%
- d. Store and monitor the waste _____ 57%
- e. Don't know _____ 21%

12. What is the primary benefit of wetlands? Do they...

- a. Promote flooding _____ 7%
- b. Help clean the water before it enters lakes, streams, rivers, or oceans _____ 53%
- c. Help keep the number of undesirable plants and animals low _____ 7%
- d. Provide good sites for landfills _____ 3%
- e. Don't know _____ 30%

Coyle, Kevin. Environmental Literacy in America: What Ten Years of NEETF/Roper Research and Related Studies Say About Environmental Literacy in the U.S. The National Environmental Education & Training Foundation, September 2005.

Correct Answers: 1b, 2c, 3a, 4b, 5c, 6d, 7d, 8a, 9c, 10b, 11d, 12b

Appendix 2

COURSE PROPOSAL

Course Title:

Environmental Studies

Course Description:

This environmental studies course should be added to the current course options for juniors or seniors. The course addresses the nature of environmental issues from an interdisciplinary perspective. The course has scientific underpinnings so that topics such as atmospheric trends, water cycles, chemicals that are used in agriculture, etc. can be addressed. Philosophical, historical political issues will be raised in class and the opposing worldviews of different nations and cultures will be studied. The literature of the course is varied and highlights many perspectives toward the natural world.

Course Format:

This course is a block course, meaning it is double the time of the standard forty-minute course. Students receive science credit and English credit for the course. Two teachers, a science teacher and an English teacher, both with training in environmental education, teach the course. The larger block of time allotted for this course allows the class to spend significant time outside of the traditional classroom, which is a key component of environmental studies. Students use some of the region's nature preserves and parks that have been established for study and recreation. The act of venturing outside the classroom is important so that students can develop a connection between themselves and their community. The outdoor, hands-on aspect of many of the lessons is crucial to fostering awareness by students of the world beyond the school. Students also gain an greater appreciation for nature and for their reliance on and relationship to nature. Many student projects, assignments and science labs will be conducted outdoors.

Need/Rationale for Change:

This environmental studies course enhances the existing high school curriculum by providing students with an opportunity to study and to reflect upon their relationship to and their effect upon the environment. It provides students the chance to give the environment a *complete* look. It is a subject that profoundly affects them and their lives, and one that has academic and practical value.

Coursework and Outcomes:

Student work will be in the form of regular homework assignments, writing assignments, science labs, quizzes and tests. Students will also be responsible for nature journals and for projects that have practical environmental applications. Students who successfully complete this environmental studies course will have a solid understanding of the environmental issues facing the world, but much more importantly, students will have developed an appreciation for the relationship between humans and nature.

Course Texts:

This course is interdisciplinary and therefore uses texts that address various subjects. The following is a list of some texts and titles that are appropriate for this course, although there are many works that are equally suitable and that may be substituted or that may supplement this list. The following list does not include current newspaper or magazine titles that are relevant to the course.

Abbey, Edward. Desert Solitaire

Carson, Rachel. Silent Spring

Dillard, Annie. Pilgrim at Tinker Creek

Leopold, Aldo. A Sand County Almanac

Lyon, Thomas J., ed. This Incomparable Land: A Book of American Nature Writing

Miller, G. Tyler, Jr. Environmental Science: Working With the Earth

Nash, Roderick Frazier. American Environmentalism: Readings in Conservation History

Pojman, Louis P. Environmental Ethics: Readings in Theory and Application

Thoreau, Henry David. Walden and Civil Disobedience

Whicher, Stephen E., ed. Selections from Ralph Waldo Emerson

Appendix 3

Unit Plan

Environmental Ethics – Perspectives and Readings

It is important for students to understand the different arguments being made about the ethical use of natural resources and regarding man's place in nature. To help clarify the different perspectives, students will read articles or excerpts from works that explain several different theories. In addition, students may read poetry, journals, or other literary accounts that help illustrate each perspective.

OBJECTIVIST VIEW

Reading: In teaching a course that attempts to inform students about a value-laden issue such as environmentalism, it is important to acknowledge the various views that educated people have toward the subject. In this first reading for the unit, students will encounter an excerpt from Albert Schweitzer's *Reverence for Life*. Students will be introduced to the concept of intrinsic value and to the notion of an objective versus a subjective view toward nature. Schweitzer argues that in order for humans to consider themselves ethical, they must acknowledge that all creatures possess the same "will to live" that humans possess, and that "it is good to maintain and cherish life; it is evil to destroy and to check life".

Justification: This piece is important to the course and to the topic because it articulates notions of ethics in terms that students, with some definitions, will be able to comprehend and refer to later in the course. Schweitzer's work is important early in the course because it expresses complex ideas that students are somewhat familiar with so they will be able to relate to the theories discussed in the reading. As the reading and the course progress, the concepts and the language become slightly more technical.

Possible Assignment: Students will be asked to consider times in their lives when they have considered the value of other creatures. Perhaps a reader response piece or an entry in student journals is appropriate after this reading.

BIOCENTRIC VIEW

Reading: Paul Taylor's article "Biocentric Egalitarianism" offers a more detailed and a more comprehensive explanation of the idea of intrinsic and objective value. In addition, Taylor clarifies the concept of egalitarianism, which means that all living creatures are of equal inherent value.

Justification: Students will now experience the subtleties that are present in arguments of philosophy, ethics, and environmentalism. While Taylor agrees with Schweitzer's theory, he must, for purposes of philosophical arguments, make clear distinctions that will allow for universal statements to be made.

Possible Assignment: Comparison among Schweitzer's, Taylor's, and Goodpaster's points of view.

NONEGALITARIAN BIOCENTRIC VIEW

Reading: To demonstrate that scholars have conflicting views, the course will introduce Kenneth Goodpaster's "On Being Morally Considerable" as its next selection. Goodpaster argues that although all creatures have value and are morally considerable, they are not equal with human beings in moral worth.

Justification: Students will see that although many ethical theories seem plausible. The more they read and learn, the more they will have to rely on their own opinions to determine what they believe.

Possible Assignment: In addition to comparing Goodpaster's arguments to those of Schweitzer and Taylor, students will read a Walt Whitman poem called "Song of the Redwood-Tree". Students will try to determine what ethical perspective the narrator holds and will make connections to the philosophical readings they have encountered thus far.

ECOCENTRIC VIEW

Reading: Students will read the longest selection thus far in the unit, Aldo Leopold's "The Land Ethic" from his work *A Sand County Almanac*. Leopold introduces a new level of ethics with respect to nature. Instead of looking at nature as being comprised of individual beings, Leopold suggests that nature must be seen holistically – as the sum of its parts. This holistic, or ecocentric view, puts humans at the same level as all other creatures on earth. In addition, the question of an organism's intrinsic value is less germane, because in a holistic structure, any action affects the entire system.

Justification: This work is intended to be central to the course. Because Leopold is a scientist, his work has applications in the science aspect of the course. Because his writing is considered literary, his work is appropriate for language arts study. Also, Leopold's holistic view of nature introduces another philosophical perspective.

Possible Assignment: Although there will probably be several assignments addressing Leopold's work, one particular assignment will be to have students look for the literary qualities of Leopold's work by creating their own poems with an ecocentric theme.

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